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ABSTRACT

Adolescent drug use in the United States remains higher than that of any other industrialized country. To explore this problem, demographic and psychosocial variables from a survey of 346 pre- and early adolescents were used to predict membership in clusters of students with varying substance use attitudes and expectancies. Cluster analysis produced five clusters of students: "Likely Abstainers," "Gatewayers," "Pleasure Seekers," "Likely Drinkers," and "Risk Takers." Various statistical analyses revealed that peer approval of alcohol, general competence, extent of social network, and non-traditional others predicted membership in the five clusters. The Likely Abstainers were composed of students with the lowest risk on the four variables in the model, whereas the Likely Drinkers were characterized by students with higher risk on those variables. The other clusters were characterized by students with two or more risk factors. The model was significant in predicting cluster membership for a cross-validation sample of 350 pre- and early adolescent students. (MKA)

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Clusters of Pre- and Early Adolescents with Varying Substance Use Expectancies: Identifying Probabilities of Membership

By

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A paper presented at the Annual Meeting of the

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Abstract

Demographic and psychosocial variables from a survey of 346 pre- and early adolescents were used to predict membership in clusters of students with varying substance use attitudes and expectancies. Cluster analysis produced five clusters of students: Likely Abstainers, Gatewayers, Pleasure Seekers, Likely Drinkers, and Risk Takers. A multinomial logit analysis revealed that peer approval of alcohol, general competence, extent of social network, and non-traditional others (connection to others outside of five traditional social domains) predicted membership in the five clusters. The Likely Abstainers were characterized by students with the lowest risk on the four variables in the model whereas the Likely Drinkers were characterized by students with the highest risk on those variables. The other clusters were characterized by students with two or more risk factors. The model was significant in predicting cluster membership for a cross-validation sample of 350 pre- and early adolescent students.

Clusters of Pre- and Early Adolescents with Varying Substance Use Expectancies: Identifying Probabilities of Membership

Although the use of most illicit drugs by adolescents in the United States declined from the mid-1970's to the early 1990's (O'Malley, Johnston, and Bachman, 1995), use by this age group is still higher in the United States than in any other industrialized country (Board of Trustees Report, 1991; Montana State Department of Public Instruction, 1991; Werch & DiClemente, 1994). In the 1990's, the trend is reversing for some drugs. Use of marijuana, LSD, amphetamines, alcohol, and cigarettes has been increasing since 1991 (O'Malley, Johnston, & Bachman, 1995). Use of inhalants has not stopped climbing since the 1980's, making it the most highly used substance other than tobacco and alcohol among younger students (O'Malley, Johnston, & Bachman, 1995). The innumerable costs and problems associated with substance use in youth often extend to adulthood as high risk behaviors become established (Kann, Warren, Harris, Collins, Douglas, Collins, Williams, Ross, & Kolbe, 1995). Among the immediate costs, drug use by youth interferes with adolescent developmental tasks (Jaynes & Rugg, 1988), contributes to the four leading causes of death among school-age youth and young adults: 1) motor vehicle crashes; 2) other unintentional injuries; 3) homicide; and 4) suicide (Kann, Warren, Harris, Collins, Douglas, Collins, Williams, Ross, & Kolbe, 1995; Morrison, Rogers, & Thomas, 1995), and increases the risk of addiction and poly-drug use (Bentler, 1992; Jaynes & Rugg, 1988).

According to most experts, identification of factors associated with substance use is the first step toward developing effective substance prevention programs (Board of Trustees Report, 1991; Dielman, Butchart, Shope, & Miller, 1990-91). Current prevention efforts focus on reducing specific risk factors that contribute to substance use and related high risk behaviors, as well as strengthening protective factors that enhance the well being of youth (Montana State Department of Public Instruction, 1991). Many researchers also contend that it is essential to identify the different types of adolescent substance users, along with their different etiologic antecedents, if appropriate prevention approaches are to be fashioned (Baumrind,1985; Dielman, Butchart, Shope, & Miller, 1990-91; Unger, Johnson, Stoddard, Nezami, & Chou, 1997; Weber, Graham, Hansen, Flay, & Johnson, 1989). Research has found that prevention programs that work with some students can be either ineffective or harmful for other students (Donaldson, Graham, Piccin, & Hansen, 1995). Unger et al. (1997) recommend that prevention programs be targeted to the "needs, attitudes, and beliefs of various subgroups of students" (p. 82).

Beliefs about the effects of alcohol and other substances on behavior, moods, and emotions have become a key concept in psychosocial models of drinking and other substance use behavior (Leigh & Stacy, 1993). Research has shown that the expectations that youth hold about substances can predict initiation and maintenance of use one year later (Bauman, 1985-86; Christiansen, Smith, Roehling, & Goldman, 1989) and nine years later (Stacy, Bentler, & Newcomb, 1991). Many researchers believe that expectancies link information about alcohol acquired in childhood with actual drinking initiation and use in adolescence (Goldman, 1989; Goldman, Brown, & Christiansen, 1987). Despite controversy, research also has shown that the expectation of negative consequences is related to a decline in drinking and other substance use (Bachman, Johnston, O'Malley, & Humphrey, 1988; Bauman,1985-86; Leigh & Stacy, 1993) whereas the expectation of positive consequences is related to an increase in such behavior (Bauman,1985-86; Leigh & Stacy, 1993; Stacy, Bentler, & Newcomb, 1991). The present study examines both negative and positive

substance use expectancies in pre- and early adolescents. It also uniquely contributes to the field by identifying the variables that are related to these expectancies.

The four purposes of the present study were 1) to create relatively homogenous clusters of pre- and early adolescent students based on their expectations and attitudes toward drinking alcohol, smoking cigarettes, and using drugs, 2) to use multinomial logit analysis to determine the probability of membership in each of the clusters using independent variables that included demographic information and students' beliefs about their family, peers, and self, 3) to create a simulation model to demonstrate how changes in probabilities of cluster membership occur as values of the independent variables vary, and 4) to develop profiles of students likely to belong to each cluster.

Method

Participants

The data utilized in the present study were gathered in the fall of 1991 as baseline data for an evaluation of a federally funded project (Enhancing Student Well-Being) aimed at training school personnel to develop and implement alcohol and other drug programs tailored to the needs of their schools (Reese & McLeod, 1992; Romano, 1992). Participants were pre- and early adolescents from grades four through eight from eight participating and two control schools. A total of 1,362 students were surveyed. The number of students surveyed from each school ranged from 64 to 195. The schools were primarily elementary and middle schools located in urban and suburban areas.

The sample consisted of 50% girls and 50% boys. Ages ranged from 8 to 15, with a mean age of 10.9 and a standard deviation of 1.6. The mean grade was 5.5 with a standard deviation of 1.4. With regard to ethnicity, 75% of the students classified themselves as White, 5% African-American, 9% Native-American, 1% Hispanic, 1% Asian-American, and 9% classified themselves as other.

Measures

Participants completed a survey that asked about demographic information; sources of information about substances; perceptions of self, school, family, and classmates; and attitudes and expectancies toward substances. The survey was tailored for a fourth-grade reading level. Independent variables were either adapted from the Minnesota Student Survey (Minnesota Department of Education, 1989), or were developed by the principal investigator and research assistants involved in the Enhancing Student Well-Being project (Reese & McLeod, 1992; Romano, 1992). Four of the independent variables were demographic in nature: sex, age, grade, and ethnicity. The other items related to putative risk factors. Students were asked to describe themselves in terms of school-liking, academic performance, health, self-esteem, general competence, mood in the last month, relationship with family, communication with parents, number of supportive people in their life, sources of information about alcohol, drugs, and tobacco, and perceptions about classmates' approval of smoking cigarettes, drinking alcohol (beer, wine, liquor), and using drugs.

The nine dependent variables consisted of scores on expectancy scales and responses to items about personal approval of substance use. The six expectancy scales were adapted from the Student Opinion Survey and had been developed using factor analysis (Faine & Bohlander, 1989). The following scales from the Student Opinion Survey were used for the present study: Positive Attitude

Toward Drugs (Drug Benefits), Positive Cigarette Perception (Cigarette Benefits), Positive Alcohol Perception (Alcohol Benefits), Negative Attitude Toward Cigarettes (Cigarette Risks), Negative Attitude Toward Alcohol (Alcohol Risks), Negative Attitude Toward Drugs (Drug Risks). The positive attitude scales asked students to respond yes or no to questions about the benefits of smoking cigarettes, drinking alcohol (beer, wine, liquor), and using drugs. The negative attitude scales asked students to agree or disagree to statements about the costs/risks of using these three substances.

Scores on the Alcohol Benefits, Drug Benefits, and Cigarette Benefits scales ranged from zero to six. Scores on these scales were coded to be inversely related to the number of items that were endorsed about the benefits of use. Scores on the Alcohol Risks and Drug Risks scales ranged from zero to five, whereas scores on the Cigarette Risks scale ranged from zero to seven. Scores on these scales were coded to reflect the number of items that were endorsed about the risks and costs of use. The distribution of scores on all six scales were negatively skewed, with the mode on each scale being the highest possible score for that scale. Because scales were coded so that a higher score meant a more unfavorable attitude, (low positive or high negative expectancies), the negative skew suggests that most students had highly unfavorable attitudes toward smoking cigarettes, drinking alcohol (beer, wine, liquor), and using drugs.

The results of reliability analyses for all six scales suggest that the scales were internally consistent. Cronbach's alpha for Alcohol Benefits, Drug Benefits, and Cigarette Benefits scales were 0.74, 0.78, and 0.76, respectively. Cronbach's alpha for Alcohol Risks, Drug Risks, and Cigarette Risks scales were 0.73, 0.77, and 0.79, respectively.

The other three dependent variables were single items asking students to indicate what they thought about smoking cigarettes, drinking alcohol, and using drugs (healthy choice, unhealthy choice, or I don't know).

Procedure

Principals sent a letter to parents explaining the nature of the survey, and asked them to return an attached form if they did not want their child to participate. Less than 1% of the students whose classes were chosen to participate in the study refused to fill out the survey.

Either a project research assistant or a classroom teacher administered the survey. Students were briefly informed about the purpose of the survey. They were told that the survey was anonymous and that they did not have to answer every question. The survey took approximately half-an-hour to complete. The survey was read to students in the lower grades.

Analysis

Due to the multivariate nature of the analyses, only cases without missing data were used. Six hundred and ninety six complete cases were divided into two groups using a random number generator. The first set of data contained 346 cases. The second set of data, containing 350 cases, was set aside to be used for cross-validation purposes.

Cluster Analysis.

A hierarchical cluster analysis was performed on the first set of 346 cases using participant scores on the nine dependent variables in order to determine the number of clusters and case

membership. Scores were standardized by dividing each variable by its standard deviation to control for differences in unit measurements. The squared Euclidean distance was used to determine cluster membership for each case.

Because cluster analysis is capable of generating a solution for even a random set of numbers, Blashfield (1980) recommends that solutions be validated before being published. Many researchers and statisticians who have worked with cluster analyses recommend that cluster solutions be externally validated through significance tests that compare clusters on relevant variables external to the solution (Aldenberfer & Blashfield, 1984; Blashfield, 1980; Weber, Graham, Hansen, Flay, & Johnson, 1989). The present study provided external validation of the cluster solution by finding variables external to the cluster solution that estimated cluster proportions when entered into a multinomial logit analysis.

Multinomial Logit Analysis.

A multinomial logit anlaysis was performed on the data to generate estimates of the probability of cluster membership as a function of the independent variables. Independent variables were entered manually and in a stepwise fashion based upon the variable that produced the most significant change in chi-square at each step. Variables entered at previous steps were tested manually for removal with a p-value criterion of 0.10. Analysis stopped when no more variables could be entered or removed.

Cross-Validation.

In order to cross-validate the results, solutions that were obtained from the derivation sample were applied to the second set of data (cross-validation sample). First, cluster means from the derivation sample were used as seeds for the cluster analysis on the cross-validation sample. Then the independent variables that were found to be significant for the derivation sample were used in a multinomial logit analysis to predict membership in the clusters for the cross-validation sample. The variables were entered together in order to test the model as a whole. The resulting chi-square indicated whether the model from the derivation sample significantly predicted cluster membership for a second set of data.

Simulation Model.

Using the independent variable weights from the multinomial logit analysis, a simulation model was created for the derivation sample. The simulation model included controls to set the values of the independent variables and a bar graph to display the probabilities of cluster membership. When using this model, any change in an independent variable value is immediately reflected in the probabilities of cluster membership. One use of the model is to find the combination of independent variable values that leads to the highest probability of membership for a given cluster.

Results

Cluster analysis on the derivation sample produced five clusters with maximum between-cluster variability and minimum within-cluster variability. Table 1 displays their cluster means, standard deviations, and frequencies. The characteristics of each cluster can be ascertained by comparing the means for each cluster on the nine dependent variables.

Table 1

Cluster Means and Standard Deviations for the Derivation Sample

	Cluster				
Scale	Likely Abstainers (n = 235)	Gatewayers (n = 42)	Pleasure Seekers (n = 36)	Likely Drinkers (n = 18)	Risk Takers (n = 14)
Alcohol Benefits					
M	5.56	5.16	2.50	4.28	4.50
SD	0.77	0.92	1.25	1.13	1.70
Drug Benefits					
M	5.66	5.44	2.36	4.78	4.79
SD	0.62	0.70	1.36	1.11	1.25
Cigarette Benefits					
M	5.69	5.30	3.06	4.39	4.93
SD	0.60	1.06	1.47	1.38	1.21
Alcohol Risks					
M	4.86	3.81	4.11	3.56	1.21
SD	0.40	1.16	0.98	1.34	0.98
Drug Risks					
M	4.93	4.42	4.19	4.50	1.50
SD	0.28	0.66	0.95	0.71	1.16
Cigarette Risks					
M	6.66	3.21	5.36	4.78	2.93
SD	0.60	1.10	1.53	1.87	2.13
Cigarette Apprvl					
M	1.99	1.86	1.97	1.50	1.93
SD	0.09	0.41	0.17	0.71	0.27
Alcohol Apprvl					
M	2.00	2.00	1.94	0.89	1.79
SD	0.07	0.00	0.23	0.47	0.43
Drug Apprvl					
M	2.00	1.98	2.00	1.50	1.93
SD	0.00	0.15	0.00	0.79	0.27

Students in the first cluster were labeled the "Likely Abstainers" because they had few positive expectancies and many negative expectancies for all substances. Students in the second cluster, the "Gatewayers," had lowered expectations about the risks associated with using cigarettes and alcohol, the so-called gateway drugs. Students in the third cluster were labeled the "Pleasure Seekers" because they endorsed relatively more items regarding the benefits associated with the use of all substances. Students in the fourth cluster responded more favorably to alcohol use than students in other clusters and were

labeled the "Likely Drinkers." Students in the fifth cluster, the "Risk Takers," had low risk expectancies for all substances.

Table 2 displays the results of the multinomial logit analysis, using the independent variables to predict cluster membership. The analysis revealed that the following four variables significantly predicted membership in the five clusters, $\chi^2(16, N = 346) = 63.941$, $p < 0.000001$: Peer Approval of Alcohol, General Competence (of the respondent), Number of People Who Care About Me, and Others Care About Me.

Table 2

Summary of Stepwise Results for Multinomial Logit Analysis

Variable	df	Chi-Square	df Change	Chi-Square Change
Step 1				
Peer Approval Of Alcohol	4	27.406****	4	27.406****
Step 2				
Competence	8	43.058****	4	15.651**
Step 3				
No. of People who Care	12	53.233****	4	10.175*
Step 4				
Others Care	16	63.941****	4	10.708*

****$p < 0.0001$. ***$p < 0.001$. **$p < 0.01$. *$p < 0.05$.

The variable, Peer Approval of Alcohol, asked students to choose between one of three responses (healthy choice, not sure, unhealthy choice) with regard to what most students in their class thought about drinking alcohol (beer, wine, liquor). The variable, General Competence, asked students to agree or disagree with the statement, "I am able to do things as well as most other people". The variable, Number of People who Care about Me, was the number of social domains that students chose when asked to indicate the people who cared about them, given six categories of people: school people, family members, parents, friends, church leaders, and others. Others (Care about Me) was the last social domain that students could choose. It contributed to the model above and beyond the contribution made by the variable, Number of People who Care about Me.

Simulation Model

A simulation model was created for the derivation sample using the coefficients for the variables that were found to be significant from the multinomial analysis. A Microsoft Excel (Version 7.0, Microsoft Corporation) spreadsheet allowed all possible values for each significant independent variable to be combined with their respective coefficients to produce probabilities of membership in the five clusters. A bar graph displayed the cluster probabilities. Drop-down list boxes allowed the user to manipulate the values of the independent variables. An All value was included in each list to hold the variable constant by inserting its mean. By changing the values of the drop-down list boxes, conditional probabilities of belonging to each cluster could be observed.

When all four variables in the model were held constant, i.e., set to All, cluster probabilities approximated the sample proportions. Actual sample proportions for the first data set were 68% for the first cluster (n = 235), 12% for the second cluster (n = 43), 10% for the third cluster (n = 36), 5%

for the fourth cluster (n = 18), and 4% for the fifth cluster (n = 14). As seen in Figure 1, when all four variables were held constant, the model predicted proportions for Clusters 1 through 5 to be 71% (n = 246), 12% (n = 42), 10% (n = 35), 3% (n = 10), and 3% (n = 10), respectively.

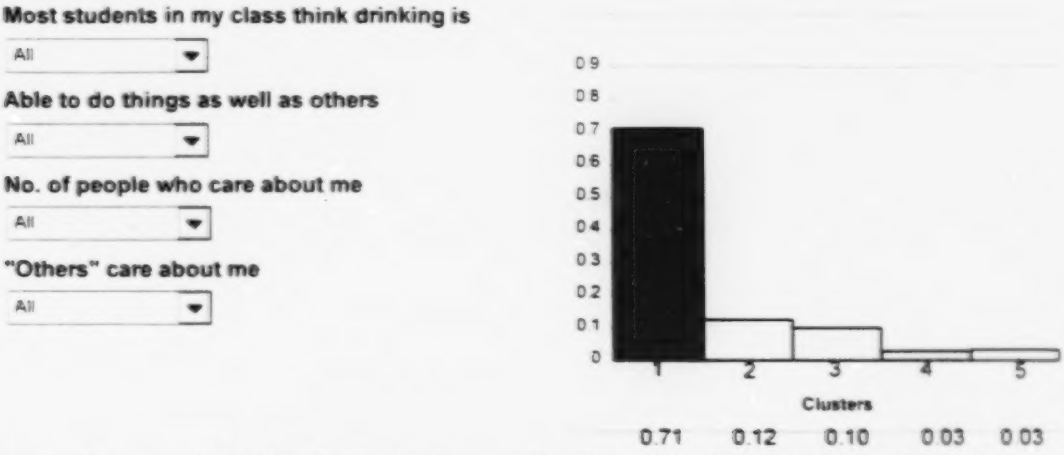

Figure 1. Cluster probabilities for derivation sample when all variables in the model are held constant.

The probability of belonging to each cluster was highest for students with particular profiles, or combinations of independent variable values. The Likely Abstainers were characterized as students who perceived few benefits and many costs associated with substance use. Figure 2 displays the profile of students most likely to belong to the Likely Abstainers. While the majority of students (71%) were predicted by the model to belong to the Likely Abstainers in the population at large, the proportion of students belonging to the Likely Abstainers was highest for students who believed that they could do things as well as others, who had people from five social domains (school, family, parents, friends, and church leaders) who cared about them, and who believed classmates disapproved of drinking alcohol. When compared to the unconditional model (when all four variables were held constant), the probability that students with this profile would belong to the Likely Abstainers increased from 0.71 to 0.84.

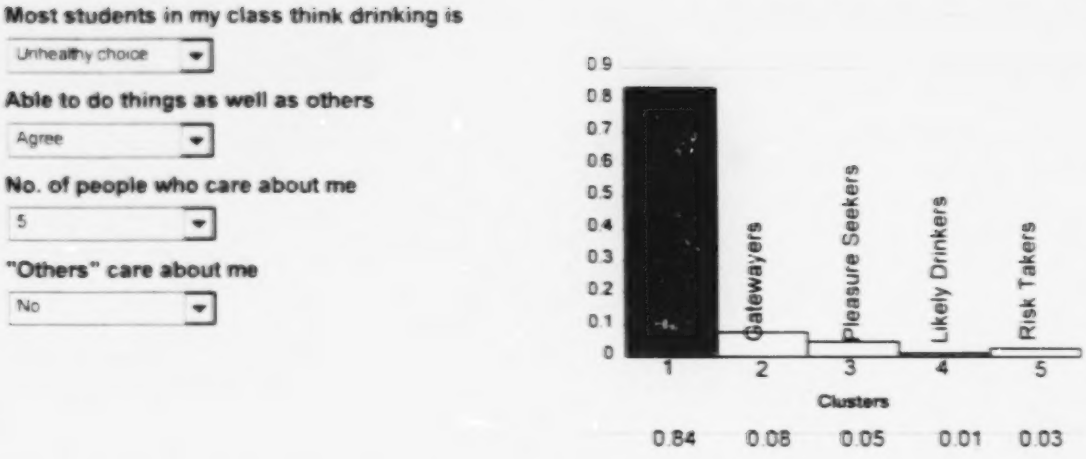

Figure 2. Cluster probabilities for students with high competence, who believe that classmates disapprove of alcohol, and that people from five different social domains care, none of whom belongs to the Others category.

The Likely Drinkers were students who personally approved of drinking alcohol. As seen in Figure 3, students most likely to belong to the Likely Drinkers had low general competence, believed that classmates thought drinking was a healthy choice, and had between one and four people who cared about them, one of whom was outside the five traditional social domains. When compared to the unconditional model, the probability that students with this profile would belong to the Likely Abstainers dropped from 0.71 to 0.05 and the probability of belonging to the Likely Drinkers increased from 0.03 to 0.66.

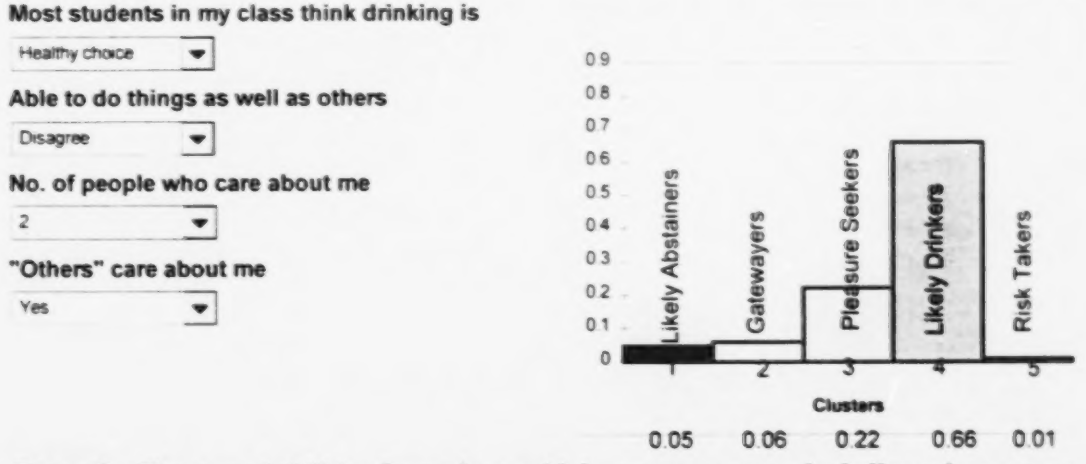

Figure 3. Cluster probabilities for students with low competence, who believe classmates approve of alcohol, and who have two people who care about them, one of whom belongs to the Others category.

The Gatewayers were students who had lower risk expectancies for alcohol and cigarettes. Figure 4 shows that the proportion of students belonging to the Gatewayers was highest for students who believed they could do things as well as others, who believed no one cared about them, and who were not sure of what classmates thought about drinking alcohol. Compared to the unconditional model, the probability that students with this profile would belong to the Likely Abstainers dropped from 0.71 to 0.32 and the probability that students would belong to the Gatewayers increased from 0.12 to 0.35.

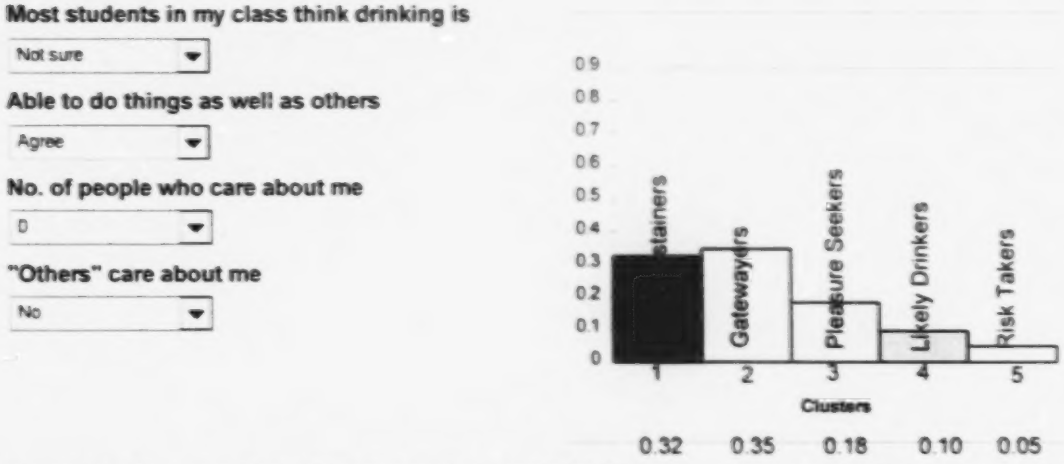

Figure 4. Cluster probabilities for students with high competence, who are not sure what classmates think about alcohol, and who believe that no one cares about them.

The Pleasure Seekers were students who associated a number of benefits with the use of all substances. Figure 5 displays the profile of students most likely to belong to the Pleasure Seekers. Students most likely to belong to the Pleasure Seekers had low general competence, had one person outside of five traditional social domains who cared, and believed that classmates thought drinking was an unhealthy choice. Compared to the unconditional model, the probability that students with this profile would belong to the Likely Abstainers dropped from 0.71 to 0.21 and the probability of belonging to the Pleasure Seekers increased from 0.10 to 0.42.

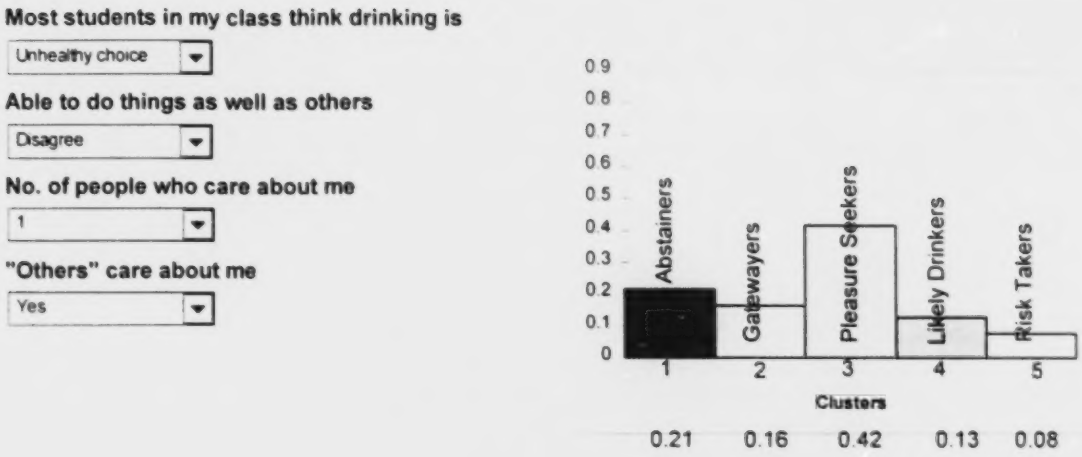

Figure 5. Cluster probabilities for students with low competence, who believe classmates disapprove of alcohol, and whose one person who cares about them belongs to the Others category.

The Risk Takers[2] were students who did not associate substance use with risk. Figure 6 shows that the combination of values that maximize the probability of belonging to the Risk Takers is similar to that of the Pleasure Seekers, with the exception that students most likely to belong to the Risk Takers believed that no one cared about them, whereas those most likely to belong to the Pleasure Seekers believed that one person outside of the five traditional social domains cared about them. Compared to the unconditional model, the probability that students with this profile would belong to the Likely Abstainers dropped from 0.71 to 0.30 and the probability of belonging to the Risk Takers increased from 0.03 to 0.24.

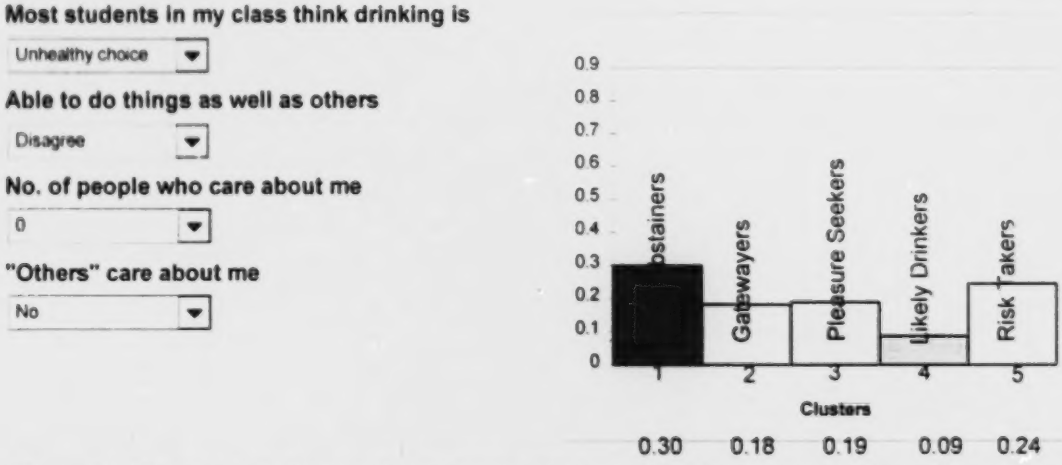

Figure 6. Cluster probabilities for students with low competence, who believe classmates disapprove of alcohol, and who believe that no one cares about them.

[2] The name refers to the increased likelihood that these students would engage in risky behaviors by not acknowledging the inherent risks, rather than in spite of the risks.

Cross-Validation

The same clusters emerged in the cross-validation sample when cluster means from the derivation sample were used as seeds in the second cluster-analysis. Variables in the multinomial logit model from the derivation sample significantly predicted cluster membership in the cross-validation sample. The chi-square value of 68.659 was obtained on 16 degrees of freedom with a p-value < 0.000001.

Discussion

According to Gilgun (1995), risk is a probabilistic concept entailing the prediction that a proportion of some at-risk group will experience adverse outcomes. Recent research suggests that multiple factors place youth at risk for alcohol and drug use. The more risk factors that a youth has, the higher the likelihood of use (Bry, McKeon, & Pandina, 1982; Fergusson & Lynskey, 1996; Patton, 1995). The present study found that different levels of risk from social and personal domains are associated with various substance use expectancies, and may account for differences among adolescent substance users.

The present study found that attachments to society, as measured by the extent of students' social networks, were related to adolescent expectations and attitudes toward substances. In particular, anti-drug attitudes increased as ties to conventional society increased. However, when students reported that someone from outside of five traditional social domains cared, chances of belonging to pro-drug clusters increased. Thus, the type of social relationship appears to be as important as the extent of the social network when considering adolescent expectations and attitudes toward substances. Pro-drug attitudes may be acquired through the process of social learning from others outside of conventional social domains.

Different levels of competence, when paired with a limited social network, were related to different pro-drug expectations and attitudes. For students with high competence, a decreased social network increased the probability of adopting lower negative expectancies for alcohol and cigarettes. For students with low competence, a decreased social network, paired with an attachment to someone outside of conventional domains, increased the probability of adopting positive expectancies for all substances. One hypothesis for this finding is that motivations for wanting to use drugs differ between students. Students with weak ties to society but who have high competence may contemplate using drugs if they believe there are few risks involved in using the more accepted types of drugs, e.g., alcohol and cigarettes. Students with weak ties to conventional society but who have low competence may contemplate using drugs if they believe there are benefits associated with use.

Different peer attitudes toward alcohol, when paired with a limited social network, were also related to different pro-drug expectations and attitudes. For students who were not sure what classmates thought about drinking alcohol, a decreased social network increased the probability of adopting lower negative expectancies for alcohol and cigarettes. For students who thought classmates approved of drinking alcohol, a decreased social network increased the probability of adopting a personal approval of drinking alcohol. Thus, students with weak ties to conventional society may be more vulnerable to peer influence.

Perceived approval of alcohol by classmates was the most powerful out of all the variables in predicting cluster membership. The probability of adopting a personal approval of alcohol increased as the perception of classmates' opinion of drinking alcohol changed from disapprove to approve. The increase was greater for students with a limited social network and even greater when a limited social network was paired with low competence. Thus, the probability that students will approve of drinking alcohol increases as levels of risk factors increase.

Unexpected Findings

Unlike other studies (Bailey & Hubbard, 1990; Buchanan, 1990-91; Ellickson & Hays, 1992), the present study did not find that attachment to school, as measured by school liking and school performance, predicted cluster membership. In particular, Ellickson and Hays (1992) found a specific link between academic orientation and outcome expectancies that the present study did not find. In addition, the present study did not find that parental attachment, as measured by family understanding and ability to come to parents with a problem, predicted cluster membership (Bailey & Hubbard, 1990). It is possible that the extent of students' social networks is a better measure of social bonding than school attachment or parental attachment per se.

In addition, self-esteem, as measured by whether students usually feel good about themselves, did not enter into the multinomial logit model once competence had entered. Low competence may be related to low ability to cope with stress, which Norem-Hebeisen and Heden (1988) found to be related to problem behavior. An inability to cope with stress may motivate students to deal with stress in unhealthy ways. In contrast, high competence may be related to the self-concept factors that characterize resilient youth (Rak & Patterson, 1996). Rak and Patterson found that the self-esteem of resilient youth is related to adaptive life competencies and is enhanced with successive triumphs over adversity. Thus, while self-esteem for adolescents with low general competence may be associated with peer affiliations, self-esteem for adolescents with high general competence may be associated with their ability to deal with challenges. This may explain why self-esteem per se did not predict cluster membership.

Another unexpected finding of the present study was the inability of age, grade, or gender to contribute to the model. Given the fact that students in the present study were pre- or early adolescents, and given the fact that gender effects do not usually appear until mid- or late adolescence (Bailey & Hubbard, 1990), it is possible that gender did not play a role in differentiating between students at this age.

However, it is harder to understand why age or grade did not play a role. It is possible that when only complete cases were used, the subsequent students had a restricted range of substance use expectancies, resulting in fewer variables that could estimate cluster proportions. Indeed, a multivariate analysis of variance on select items indicated that students who did not complete the survey were more likely to be younger, less happy, and have more favorable views of substances than those who did complete the survey. Had a broader range of students been analyzed, it is quite likely that variables such as grade or age would have been found to account for differences among groups. The subset of students whose data were analyzed in the present study represent less deviant students who may be at the beginning stages of considering substance use. As a consequence, the results of this study may generalize only to those pre- and early adolescent students who are contemplating the use substances, as opposed to those who are preparing or have taken action to use substances (Werch & DiClemente, 1994).

Prevention Implications

The findings from the present study suggest that there are multiple pathways toward personal approval of alcohol. Within the context of previous research on the etiology of adolescent substance use, the following pathways are surmised. Weak ties to conventional society may increase the probability that students will view drug use as a personal choice available to them. Indeed, Krizek, Hecht, and Miller (1993) found that drug users view drug use as an opportunity to take control over their lives. However, the risks associated with use may deter some of these students from using. Other students may contemplate using gateway substances, which, because of their social acceptability, may not seem to be as harmful as other drugs. When these students perceive that classmates think drinking is a healthy choice, they may be more inclined to believe drinking is not a risky proposition, and may adopt a personal approval of alcohol. Prevention approaches that emphasize the risks and disapproval associated with use may have an impact upon this type of student.

Other students, those with weak ties to society and low competence, may contemplate using substances, either because of a perception that there are few risks associated with use or because of a perception that there are many benefits to using. Students with low competence who have ties to others outside of traditional domains may learn there are many benefits associated with use through interactions with these people. They may be motivated to use substances as a way to cope with stress and to gain other benefits they have observed through ties to unconventional others. Perceptions that classmates think drinking is a healthy choice may reinforce the belief that drinking is beneficial. Students who turn to substances to achieve desired internal states may need to learn how to gain pleasure and relieve pain through constructive coping skills, such as communication, relaxation, or stress inoculation techniques.

Overall, students with many attachments to conventional society appear to be less inclined to view substance use favorably. Such social supports appear to buffer otherwise vulnerable adolescents from adopting favorable attitudes and expectancies. However, as those ties start to diminish, students appear to be more susceptible to the influence of peer approval of use. Thus, the first line of defense for prevention programs may be to ensure that adolescents have attachments to others who can act as role models and convey traditional values, such as parents, family members, friends, church leaders and school people. When adolescents feel embedded within a community of caring individuals, they may be more inclined to understand drug use as a choice that has repercussions for the people that matter to them.

Concluding Remarks

Within the context of previous research, findings from the present study may offer some insight into why prevention programs with multiple components that impact upon multiple spheres work better than those that are more limited in nature (Johnson, Pentz, Weber, Dwyer, Baaer, MacKinnon, Hansen, & Flay, 1990; Moskowitz, 1989; Wagenaar and Perry, 1994; Werch & DiClemente, 1994). While prevention programs that focus on one risk factor may help students who are vulnerable on that risk factor, they may not help students who are vulnerable on other risk factors. It is in the interest of prevention specialists to recognize the different risk factors and tailor approaches to various subgroups of students. The specialist can then use multinomial logit models

on pre- and post prevention data to display the effectiveness of programs in terms of reducing the proportion of at-risk students who develop favorable attitudes toward substances.

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